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animals are supposed to be actuated by the same motives as men, and their communities to be organized according to the rules of ethics that prevail in human society. Examples of the relation of animals and mankind were taken from the religious medicine of the Cherokees. Finally an account was given of the universal belief that animals can assume the human form, and appear at pleasure in that manner. In this manner it was made to appear that no account could be given of the American superstition without examining the character of primitive belief.

Finally the great psychological importance of the collection of folk-lore, and the necessity of immediate effort to preserve a record of it in this country, were dwelt upon. As the secretary of the American Folk-Lore Society, the lecturer presented the claims of that body, and expressed a hope that steps would be taken to increase interest in the study in New York, and to obtain more general co-operation in the important task lying before collectors and special students.

HEALTH MATTERS.

Improved Sanitation in London.

DR. B. W. RICHARDSON, in his abridgment of " The Health of Nations," gives a comparison of mortality in the Elizabethan and Victorian eras: "According to John Graunt's reports, from the parish registers, the condition of the whole city of London in the time of Queen Elizabeth was very much that of a 'slum.' The death rate was, in fact, that of a slum (it was more than 40 per thousand); but now, under some advance towards unity and centralization, it is about 20 per thousand, still including upwards of one-third of preventable deaths. The death rate then largely exceeded the birth-rate, while now the reverse is the case. The death-rate of the children under five years was then one third, or 33 per hundred: it is now 27 per hundred, and grievously too heavy. The deaths from old age, or the age then called old, of seventy, were 7 per cent: they are now sadly too low, but even in the city proper they are 18 per cent. As to personal security, John Graunt boasted that not more than one in two thousand was then murdered annually, which he ascribes to good local government. At the same rate now, murders in the whole of the metropolis should amount to no less than 2,500 annually, whereas they actnally amount to an average of no more than 12 for the whole five millions of population,—a population which approaches to that of the whole kingdom of England and Wales in the time of Elizabeth."

Removal of Micro-Organisms from Water.

Dr. Krüger, considering the fact that more bacteria are usually present in rivers than in lakes, notwithstanding that lakes themselves in many cases are more or less polluted by rivers passing through populous towns, believes that this rapid decrease in the number of organisms may very possibly be due in part to the action of direct sunlight, but in the main to the tendency of water in a comparatively undisturbed state to deposit and precipitate. He therefore carried out a number of experiments with a view to determine how far the removal of organisms was brought about by the mere mechanical deposition of inert matter, and also by precipitation as a result of chemical action. The mechanical precipitants employed, all in a state of fine powder and sterilized, were alumina, brick-dust, clay, chalk, sand, coke, and charcoal. Water obtained from an ordinary service-pipe was impregnated with a liquid containing a bacillus growth of a species incident to tap-water. This was divided into two portions,—one for precipitation with the inert substance, and the other was untreated for the sake of comparison. Experiments were similarly carried out in which precipitation was obtained as a result of chemical action such as is brought about by the addition to the water, containing naturally lime, magnesia, etc., substances like wood-ash, sulphate of alumina, and slaked lime. The general conclusion come to by the author from the results obtained, as we learn from the Medical Record of Sept. 27, is that undoubtedly large numbers of bacteria are carried down by inert substances merely sinking in the water, but that the action is very considerably increased when, in addition to mechanical deposition, a chemical precipitation also

takes place. The corollary is evident,—inert substances do mechanically assist in the precipitation of micro organisms, but preference should be given to chemical treatments.

Why He renounced Vegetarianism.

Dr. Alanus, the former leader of the vegetarians in Germany, has renounced his faith, and resumed the use of animal food, says the Medical Record of Sept. 27. In a letter written to a local paper, he gives the reasons for his apostacy. He had lived for a long time, he said, on a purely vegetable diet without experiencing any ill effects, feeling no worse and no better than he had formerly while living as the rest of mankind. One day, however, he found that his arteries were apparently becoming atheromatous. He was unable to account for this, as he was not a drinking man, and was still under forty years of age. Finally he came across a statement by Monin, to the effect that abstinence from animal food was a fertile cause of atheroma. He could hardly have been much of a student of dietetics not to have come across that theory until his own arteries had become diseased. There is nothing like taking comfort out of every thing, however; and he now consoles himself with the remark that he has "become richer by one experience, which has shown me that one single brutal fact can knock down the most beautiful theoretical building."

Is Cancer Contagious too?

The fact that certain spots constitute apparent foci for the spread of cancerous disease has ere now been noted, though we are still completely in the dark as to the causes which underlie these vagaries of disfribution. It is, however, only by systematic close observation that we can hope to solve the enigma, and acquire the knowledge which alone will enable us to check the ravages of a terrible and implacable disease. Some observations made by Dr. Arnaudet in the little village of Saint Sylvestre-de-Cormeilles, in Normandy, are interesting in this respect. The village, according to the Medical Press, only numbers some four hundred inhabitants, but among them the deaths from cancer are four times more numerous than at Paris (14.88 as compared with 4.16 per hundred deaths). In the course of his inquiry into the causes of this special mortality, Dr. Arnaudet discovered that there were certain "cancer nests" which the theory of contagion could alone explain. The water-supply of these people is drawn almost exclusively from surface ponds; but he observes that very little water is drunk, though it is used in the manufacture of cider. He shows on a chart that the malady developed itself successively along a line corresponding to the water-supply supplying the ponds, and he is evidently strongly inclined to attribute the outbreak to the water, or, secondarily, to the cider. He subsequently extended his observations to four neighboring communes, in all of which the proportion of deaths from cancer was largely in excess of the normal rate. This inequality of distribution seems to point to the existence of local causative conditions, the nature of which it is highly important to elucidate.

Treatment of Tuberculosis by the Vaccine Method.

On Nov. 19, 1889, Drs. J. Grancher and St. Martin addressed to the Académie de Médecine, Paris, a sealed packet relating to a method of treatment and preventive inoculation of tuberculosis based upon numerous experiments which they had made on rabbits. The communication made by Dr. Koch to the Berlin Congress (of which the full text was published in the British Medical Journal of Aug. 16), concerning the results which he has obtained in rendering guinea-pigs refractory to tuberculosis, or in curing them of advanced forms of tuberculosis, has induced MM. Grancher and St. Martin to make known their researches on the same subject earlier than they would otherwise have done. In all these experiments they chose the rabbit as the subject of inoculation and intravenous injection, because there is thus produced a tuberculosis which kills very quickly, and at an almost fixed date, with constant lesions of the liver, the spleen, and the lungs, and which defies all local treatment. Tuberculosis thus induced being always fatal, a solid basis is thus secured which allows exact appreciation of the negative or positive results of any method which tends to produce the refractory state or to cure after infection. The

method employed by MM. Grancher and St. Martin was the injection of tuberculosis cultures attenuated in various degrees, and used like the dried spinal marrow in Pasteur's treatment of rabies and hydrophobia. Nine degrees of attenuation have been obtained, the four last being such that the cultivation remained sterile. The injections were made first with the most attenuated cultivations, and then with more and more virulent ones. The authors consider that by this method they have succeeded, on the one hand, in conferring on rabbits prolonged resisting power against the most certain and the most rapid experimental tuberculosis, and, on the other hand in conferring an immunity against that disease, the duration of which remains to be determined.

A Return to Blood-Letting.

M. Crocq, who has frequently written and spoken in favor of the revival of venesection, made a powerful speech dealing with this subject at a recent meeting of the Belgian Académie de Médecine, says the *Lancet* of Aug. 9. Speaking of pneumonia, he declared his disbelief in the cause of the disease being either Friedländer's bacillus or the diplococcus of Fraenkel and Weichselbaum. Inoculation of this latter microbe, he remarked, is said to procure immunity from subsequent inoculations, which is exactly contrary to the effect of an attack of pneumonia, for it rather predisposes the subject to subsequent attacks. Again, M. Crocq injected sputum from pneumonic patients in which the diplococcus had been found, into the lungs of four rabbits, but none of them contracted pneumonia. Lastly, in a doubtful hospital case the sputum was examined, and found to contain the diplococcus, but at the post-mortem examination no pneumonia was discovered. M. Crocq has never met with any cases of contagion in pneumonia, and Finckler's cases he considers were not pneumonia at all. Moreover, Fraenkel's microbe is found in affections which are neither pneumonia nor contagious. The mortality usually reported by other observers in pneumonia varies greatly; that is to say, from 5 to 35 per cent. M. Crocq has no mortality at all. He arrests all his pneumonia cases by bleeding. Rheumatic-fever, and even puerperal metro-peritonitis, he treats in the same way. The latter, he declared (amidst tokens of dissent) can be thus cured in the great majority of cases. "Never," he went on, "have I regretted having bled a patient, though I have often been sorry that I have abstained from doing so. . . . If I were to be forbidden to bleed, I would give up the practice of medicine." He was, of course, careful to explain that blood-letting, to be of any service, must be practised intelligently, and not abused, as he fears it may again come to be after the wave of reaction has once more made it popular.

LETTERS TO THE EDITOR.

** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.

The editor will be glad to publish any queries consonant with the character of the journal.

On request, twenty copies of the number containing his communication will be furnished free to any correspondent.

Professor Hazen and Espy's Experiments.

A CORRESPONDENT has recently called my attention to certain communications of Professor Hazen to *Science* and the *American Meteorological Journal*, in which Espy's experiments are assailed, and thus indirectly my theory of cyclones and tornadoes, and he thinks there should be a reply to them. A reply, so far as they bear upon my theory, if thought necessary, is very easy; so easy, indeed, that I had not thought it necessary. Besides, I have been desirous of avoiding an unprofitable controversy with Professor Hazen on this subject.

Inasmuch as I have never used any of the results of Espy's experiments, any attack upon these experiments does not reach me, except so far as it may bear upon the results of other great physical experimenters. It is true, I sometimes refer to this noted pioneer in meteorological advancement, as any one in this age may still refer to Kepler and Newton, and very properly, but it is not at all necessary. The formula which I have used throughout in my researches, as the basis of the physical part of my theory,

and which completely covers the ground of Espy's experiments, is one given by Dr. Hann in a paper published in the *Zeitschrift* of the Austrian Meteorological Society for 1874, and translated by Professor Abbe, and republished in the "Smithsonian Report for 1877." This formula, in a somewhat different form, originated with Sir William Thomson, and has been used, and gradually brought to its present form, by Dr. Reye, Peslin, Clausius, Hann, etc., and so rests upon high authority. The physical constants in this formula have been determined by renowned experimenting physicists. They are the mechanical equivalent of a unit of heat, the specific heat of air, the latent heat of aqueous vapor, the tension of the aqueous vapor of saturated air at any given temperature, etc. From this formula have been computed the rate with which ascending dry air decreases in temperature with increase of altitude, which is $0.99°$ for each hundred metres, and also the same for ascending saturated air at given temperatures and altitudes. These latter are given in Table III. of the appendix of my "Popular Treatise on the Winds," etc., and range from $0.37°$ for a high temperature at the earth's surface, up to $0.74°$ for a temperature of $-10°$ C., the values for all temperatures decreasing with increase of altitude. With these data I have illustrated, by means of the table on p. 232 of the work referred to above, how the temperature in ascending currents decreases with increase of altitude under different assumed conditions, and have shown that it is very much greater than it would be in the case of dry air, and also greater than that of the surrounding air when the lower strata become a little more warmed up than usual in comparison with the upper strata. All these results have been deduced from a formula resting upon the high authorities already mentioned, and having had its origin with Sir William Thomson less than thirty years ago. Yet Professor Hazen makes the astonishing assertion that nothing has been done since Espy's time, more than fifty years ago, and that "the profoundest calculations and speculations upon the development of energy in the free air are based upon a few experiments of the crudest sort made in a small jar."

The latent heat of aqueous vapor in the formula referred to, as determined by Regnault, may be expressed for ordinary temperatures by $r=607-708t$; but according to Hazen it should be $r=0$, for he maintains that there is no latent heat set free in condensation. With $r=0$ in the formula, instead of the numbers in the table referred to above, ranging at the earth's surface from $0.37°$ to $0.74°$, and being still less at high altitudes, we should have for all temperatures and altitudes $0.99°$; that is, the rate of decrease of temperature in all cases would be that of ascending dry air, and of course the energy upon which the cyclone or tornado depends would be much diminished. Now, if Regnault has made so great a blunder, and a cloud is thrown over his reputation by Hazen's experiments, it is for the experimenting physicists of the day to take up the matter, and not for me; for I am not an experimenter, and, if I have erred, it is in relying upon insufficient authority.

It has never been claimed, even by Espy himself, that his experiments were of a refined and accurate character, and that his results were any more than rough approximations. They have been regarded as important first steps only. Espy says, " I would not wish to be understood here as saying by implication that the numbers used in this paper are strictly correct. These numbers are introduced chiefly for the purpose of illustrating the theory." He again says with regard to his results, "The grand object, then, for which these experiments were instituted, is established beyond doubt,—that the latent caloric of vapor causes the air to occupy much more space when it is imparted to the air than when it is united with water in the form of vapor." The same is shown by Dr. Hann's formula, but the latter gives quantitative results. Espy inferred from his experiments that when dry air ascends it becomes colder about $1.25°$ for every hundred yards of ascent. The true amount is $1.6°$. He also inferred, that, when air ascends from the earth, it will begin to form cloud when it rises about as many times one hundred yards as the temperature of the air is above the dew-point in degrees of Fahrenheit. The true number is seventy-six yards.

There is a great error in several of Hazen's papers with regard